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Plane Trees.

LONG before Xerxes encircled the Plane-tree of Lycia with a band of gold to mark his admiration for its beauty the peoples of the east venerated these trees for their massive trunks and wide umbrageous crowns of beautiful and cheerful foliage. The Persians, and after them the Greeks, formed their groves and shaded their dwellings with Plane-trees, which were the first shade-trees planted by the inhabitants of the valleys of north-western India. The Romans, who shared with the Greeks their admiration for the Plane-tree, carried it to Europe and planted it in all the southern countries which they overran. This Plane-tree of the east is Platanus orientalis, and its native land extends from the Grecian islands and peninsula to Afghanistan and Cashmere. The Oriental Plane is one of the noblest of trees, and fabulous stories are told of the great age, the enormous trunks and the far-spreading branches of some old specimens. Such stories are, perhaps, somewhat exaggerated, although large Plane-trees still exist in eastern Europe. A portrait of one of these old trees, now standing in the court of the Janissaries in the old Seraglio, in Constantinople, was published in our third volume, and gives an idea of the size this tree attains and the massiveness it preserves, even in very old age. The Oriental Plane is still the favorite shade-tree of southern Europe, where for two centuries, at least, it has been planted in the streets and squares of modern cities. It was brought to this country not very long ago, probably, and thrives in all the middle states, where it has proved itself an excellent street-tree; and it supports even the climate of New England.

In the flora of the Old World there is a single member of the genus Platanus, or Plane-tree, and North America now contains the others, only four or five in number, although the genus was once more widely distributed and richer in species, and during the tertiary period of the world's existence grew in Greenland and Arctic America, and then spreading southward inhabited central Europe and midcontinental North America, regions where no Plane-trees now occur. The entire absence of these trees from the flora of eastern Asia is an anomaly in plant geography which is not easy to explain, for tertiary plants of circumpolar distribution which have survived to the present time, like Platanus, are generally found in the existing floras of eastern America and eastern Asia, and it is exceptional to find one of these genera represented only in North America and Europe.

There are strong points of resemblance in all the trees of this genus; the structure of their flowers and fruits is practically identical; they all grow to a very large size, with enormous stems covered below with dark scaly bark, and above and on the branches with smooth, thin, light gray or greenish bark separating easily in great thin scales, which, in falling, expose large irregular surfaces of the pale yellow, whitish or greenish inner bark; they all produce the same peculiar leaf-buds enclosed in summer in cavities of the enlarged bases of the leaf-stalks, and their lobed leaves are all of ample size and of the same color and texture; the wood of all the Plane-trees is hard, heavy, light red-brown, and contains broad and very conspicuous medullary rays, which make it attractive as a furniture wood and for the interior finish of houses; and it is only by the shape of the leaves and by the amount and character of the pubescence which clothes their lower surface that the different species can be distinguished.

Of the Plane-trees of the New World three species grow within the territory of the United States and two exclusively in Mexico. Of the Mexican species one is a little-known and rather problematical tree of the south; the other, Populus Mexicana, inhabits Nuovo Leon and the states to the south of it. This tree is frequently planted in the plazas of the cities of north-eastern Mexico, and is perhaps the handsomest of all Plane-trees, the under surface of the mature leaves being clothed with a thick coat of snowy-white tomentum which, as they flutter in the wind, makes a beautiful contrast with the dark, rich green of their upper surface. This tree, although it has been long known to botanists, seems to have escaped the attention of the horticulturists of southern Europe, where it may be expected to flourish and become an ornamental tr ee of the first class.

Of the species of the United States the most widely distributed, the largest and the best-known is Platanus occidentalis of the east. Although not the tallest deciduous-leaved tree of the United States, perhaps, it is the most massive of them all, and the largest tree which grows on the continent east of the California Sierra Nevada. On the rich bottom-lands of the basin of the lower Ohio River the Plane-tree sometimes attains the height of one hundred and seventy feet, and forms a trunk ten or eleven feet in diameter above its much-swollen base. Trunks of this size are usually hollow from old age, and such great trees, which were common when the Mississippi Valley was first settled by white men, are now rare; and each year sees their numbers decrease. In the second volume of this journal the portraits of two of these trees growing on the bottoms near the junction of the White River with the Wabash were published, and on page 55 of the present issue will be found that of another tree in the same region made from a photograph for which we are indebted to Dr. Jacob Schneck, of Mount Carmel, Illinois, the centre of the richest and one of the most interesting tree regions of this country.

Platanus occidentalis is one of the common inhabitants of the borders of streams and lakes and of rich bottom-lands, and is distributed from southern Maine to the northern shores of Lake Ontario and to eastern Nebraska, and southward to Florida and western Texas. It is occasionally cultivated in the eastern states and in Europe, although as a planted tree it is much less common than the Old World Plane, which is a more desirable street and park tree here, as our native species suffers more seriously from a fungus which every spring destroys the young leaves in the seaboard states, causing them to turn brown and wither, as if the trees had been scorched by fire. This pest is so serious that the trees are often stunted and deformed

in their efforts to produce new crops of leaves to replace those killed by the fungus, and the planting of the western Plane cannot be recommended. The wood of this tree is now used in very large quantities in the United States in making furniture and in finishing houses. Formerly it was almost the only material used in the manufacture of the boxes made for packing tobacco, but the demand for wood for this purpose has become so great that that of other trees is now often substituted for plane-wood in the manufacture of tobacco cases.

The second of the North American Plane-trees, Platanus racemosa, inhabits the banks of streams in California, where it is distributed from the valley of the lower Sacramento River southward through the interior valleys and coast ranges of the state, and finds its most southern home on San Pedro Martir, a high mountain half-way down the peninsula of Lower California, where several other California trees have retained a foothold. It is one of the largest and most beautiful of the deciduous-leaved trees of California, and is very common on river-banks in the neighborhood of the coast from Monterey to San Diego, growing often to the height of more than a hundred feet and forming a trunk eight or nine feet through and sometimes erect and free of branches for half its height, but more often divided near the ground into several secondary stems which are erect or inclining, or often prostrate, for twenty or thirty feet at the base, and then turn upward toward the sky.

The third species of the United States, Platanus Wrightii, bears the name of the indefatigable botanical collector, Charles Wright, who discovered it nearly fifty years ago in southern Arizona when he was connected with the survey undertaken to establish the boundary between the United States and Mexico. It inhabits the banks of streams in the cañons of the mountain ranges which stretch along our south-western boundary from the Rio Grande to the Colorado, and, like most of the trees of these mountains, belongs to the flora of northern Mexico rather than to that of the United States. As it appears in the sombre cañons of these sun-baked mountains Platanus Wrightii, which frequently attains the height of eighty feet and makes a trunk four or five feet through, is a splendid object, rising high above the Walnuts, Willows and Alders with which it grows, and spreading far its great limbs, clothed in pale sea-green bark. From other Plane-trees it differs in this coloring of the juvenile bark and in the shape of the leaves, which are divided by narrow sinuses, sometimes nearly to the centre, into from three to seven, but usually into five, elongated, acute lobes, and are often deeply cordate by the downward projection of the two lower lobes. The Arizona Plane-tree is the largest deciduous-leaved tree in the mountain forests of the south-west and one of the most distinct and beautiful trees of the genus.

Forest Lands in Massachusetts.

THE town of Washington, Massachusetts, is located at the highest point on the Boston and Albany Railroad. About Washington, as a centre, a large area of land is given up to second-growth timber, and a view from the top of one of the higher summits of the mountain range extending north or south from the railway will disclose a large territory growing up to forests. Last summer I made a carriage-drive over a considerable section of Berkshire County, where this timber-land could be readily seen. Numerous observations were also taken from high points not ordinarily visited. Among these was Becket Mountain, 2,194 feet above the sea-level, from which a view is secured extending from the Catskills on the west to the Holyoke range on the east.

A person unfamiliar with this region would be surprised at the amount of land now occupied by growing timber. Leaving out of consideration the immediate vicinity of the towns, and a few rural homes about Lenox and Stockbridge, clearings are the exceptions, and not the rule. Driving east or south from Lee extensive forest tracts are found. The country is rapidly becoming reforested. These lands have a very low valuation. During the past year Pittsfield and New York parties have been purchasing extensively in Washington, so that already it is claimed that one syndicate controls some 5,000 or more acres, for which four dollars an acre have been paid. This land, it is understood, is to be fenced, and, rumor has it, will be kept as a game preserve. The people occupying this region, so far as I have been able to learn, have no faith in the future prospects of the forests as a source of revenue. Hardwood, delivered, brings three dollars a cord in the local market, and this price hardly pays the hauling over poor roads. The supply of saw-logs is quite limited; tan bark is comparatively scarce, and the railroads get their ties cheaper elsewhere. The country is now rapidly growing up to forests more extensively than ever in recent years.

Nevertheless, I believe that the timber resources of these New England hills will have a significant value in the future. The sources of timber-supply of the country are becoming more and more restricted. Michigan, Minnesota and Wisconsin no longer have extensive areas of timber. The big timber-fields adjacent to the good shipping points are becoming scarce. In Massachusetts and New England are many small forests twenty to thirty years old that are producing promising crops of timber for the future. Within ten or twenty years they will begin to yield a revenue from timber-supply, without taking cordwood into account, and such lands as these ought to be safe investments for the farmer and for the future.

And this suggests a field for investigation for the agricultural colleges in the several New England states. As an example, would it not be desirable and appropriate for the Massachusetts Agricultural College to secure a block of, say, one hundred or more acres of cheap land in second-growth timber, and use it as a permanent field for systematic forestry? Many problems of a practical nature could here be investigated that cannot be considered on the high-priced land where the college stands. Here could be maintained a summer school of forestry, where, for two or three months, students might repair to study under conditions at present unavailable in New England, if not in the United States. The summer school is now accomplishing work in many directions, but the first summer school in forestry is yet to be created.

A block of such timber-land might be made a great source of instruction and benefit to the farmers of Massachusetts, and the practicability of timber-culture in the state could have a fair trial. The farmer needs to be educated as to the possibilities of these rough hills for forest purposes. He has neither the time nor the money nor the training which would enable him to make these investigations for himself, and the state can well afford to help him and set the example if this will encourage the study and practice of scientific forestry by the people.

In the mean time the timber reserves of the state are growing, and some day their value as a source of income will become manifest.

Lafayette, Ind. *C. S. Plumb.*

Foreign Correspondence.

London Letter.

New Orchids.—The productions of the hybridist are the only noteworthy recent additions to garden Orchids, and there are only few of these that call for special mention. Cypripedium Miss M. Ames, a hybrid between C. Curtisii and C. concolor, raised by Messrs. F. Sander & Co., is remarkable in form and in the yellowish green wax-like flowers tinged with rose. The pouch is pinched laterally, as in C. concolor. Another Sanderian hybrid, named Said Lloyd, raised from C. Godefroyæ and C. venustum, has yellow and pale brown flowers, heavily blotched with chocolate-brown; is sufficiently distinct to find favor with

collectors of hybrid Cypripediums. Another hybrid addition to this genus is a cross between C. callosum and C. Druryi, raised at St. Albans and named A. R. Smith. It has large yellow and dull brown flowers, which are not as attractive as the characters of the parents would lead one to expect. Oncidium Wheatleyanum, although not new, is a rare plant in English collections. It was shown in flower this week by Sir Trevor Lawrence. I should call it a form of O. varicosum, with a large blotch of red-brown at the base of the deeply lobed labellum.

DENDROBIUM JOHNSONÆ.—A well-flowered example of this Australian Dendrobe was among the plants exhibited at the Drill Hall this week by Messrs. F. Sander & Co. It is a distinct species, but disappointing horticulturally, the segments of the flowers being too narrow and the pose of the inflorescence wanting that grace and fullness which characterize the pick of the Australian members of this genus. The flowers are smaller than those shown in published figures of this species.

VANDA CHARLESWORTHII.—Baron Schrœder exhibited a plant of this rare Vanda last Tuesday. It is supposed to be a natural hybrid between V. cœrulea and V. Bensoni, and was described by Mr. Rolfe in *The Orchid Review* last year, page 323. The flowers are two and a half inches across, nearly white, veined and marbled with rose-purple, the sepals and petals resembling those of V. cœrulea in texture and form, while the lip is like that of V. Bensoni. The leaves are narrower than those of V. cœrulea and the scapes are erect, the plant exhibited having two scapes, with an aggregate of seven flowers.

CYPRIPEDIUM MASTERSIANUM.—This hitherto rare species was imported probably from Borneo to Kew nearly twenty years ago, and was described by Reichenbach in 1879 from materials supplied by Messrs. Veitch & Sons, and named in compliment to Dr. Masters, F.R.S., the distinguished editor of *The Gardeners' Chronicle*. It has broad leaves about a foot long, deep green with paler tessellations, and erect scapes fifteen inches high, each bearing a large flower, probably the largest in the genus. The dorsal sepal is orbicular, bright green, with a broad margin of white and a fringed edge; the petals are horizontal, spathulate, nearly two inches long, dull red, with black-purple warts near the base and along the upper margin; the pouch is very large and inflated and is colored reddish brown, shaded with green and spotted with purple. Messrs. Sander & Co. have succeeded in rediscovering and importing a large quantity of plants of this species and offered 5,000 plants of it for sale by auction recently. The plants were in excellent condition and realized fair prices.

PRIMULA SINENSIS.—A special feature of the last meeting of the Royal Horticultural Society was a large collection of the forms of Primula Sinensis, exhibited by Messrs. H. Cannell & Sons, Swanley, who have long held a foremost place among the trade growers and breeders of this useful winter-flowering greenhouse plant. Seven large houses are filled with it in all its best forms, about ten thousand plants being grown annually for seeds. The best white variety is one called White Perfection, which has short-stalked large heads of flowers, each one and a half inches across, conspicuously imbricated, the segments wavy and crisp-edged. Equally beautiful and large in flower is a carmine-pink variety called Cannell's Pink. These two varieties come true from seed and are very floriferous. They have, however, one fault, from a purely decorative point of view, a fault common to nearly all the improved strains of this Primula—namely, the flower-stalks are too short, and, consequently, the plants have a squat, stubby look even at their best. Messrs. Cannell are, however, alive to this defect, and for several years now they have aimed at producing a race with looser, taller trusses. They have made considerable progress in this direction, their Pyramidalis strain, bred from a loose, tall-stalked variety known as White Lady, crossed with the short-stalked, large-flowered forms, being a decided improvement. Twenty years ago long-stalked Primulas were discarded as weedy and lacking finish, but Messrs. Cannell were fortunate in securing this White Lady variety, which had been kept for years in the famous garden of Sir George Macleay, at Pendell Court, and with its aid they are rectifying the mistakes, or, at any rate, are going back to strains ignored or repudiated by recent breeders. These fine varieties come true from seeds, a remarkable fact, but one about which there can be no question. A new variety called Cannell's Gem, with rich carnation-pink flowers, of which a few plants in flower were shown by Messrs. Cannell, is certain to be popular on account of its color. It has yet to be tested as a seed-bearer, as sometimes a beautiful variety is practically barren when fertilized with its own pollen. Swanley Blue is a deep mauve-flowered variety, which is the nearest approach to a true blue Chinese Primrose so far produced.

London. *W. Watson.*

Cultural Department.

Hybridizing Nymphæas.

IT is generally supposed that Nymphæas are difficult to hybridize, an opinion based on the numerous failures to cross some of the species. Most of these attempts, however, have been made with species which are not closely related to each other; for instance, the pollen of N. cœrulea has been tried on flowers of N. odorata or N. alba, and pollen of N. Devoniensis or N. rubra on some white-flowering hardy kind. It is difficult to imagine a cross between the species mentioned above, because their habits of growth are so widely different.

For several years I have experimented in hybridizing some of the kinds with satisfactory results, but my successes have been scored when the seed parent and pollen parent were closely related. To show how easily Nymphæas are hybridized one has only to take a plant of the white-flowered N. gracilis and flower it in company with any of the Zanzibar section. The result will be that, without any other interference than that effected by the wasp-like insects which infest the blooms, it is next to impossible to get seed that will come true. The seedlings will show foliage almost similar to that of N. gracilis, but the flowers will be either light or dark purple, instead of white, and in shape pretty nearly intermediate between the Zanzibar varieties and N. gracilis. Again, if the true dark purple-flowered N. Zanzibarensis be isolated from the lighter-flowered form called azurea and from all others related to it, many of the seedlings raised from it will have flowers every bit as deep in color as those of the parent, whereas if seedlings be raised from a plant which has grown in company with its lighter-flowered forms those seedlings will have flowers of an intermediate color.

In the night-blooming section all the kinds are easily crossed, and any one having the facilities, who will spend a half hour or so over a bloom, can have hybrids of his own raising. Take, for instance, the well-known Nymphæa Lotus, which, so far as my experience has shown, sets and ripens more seed than any other of the night-bloomers, unless it be its variety dentata. As the seed parent I prefer N. Lotus to N. dentata, as its flowers are of such a graceful outline. When crossed with N. Sturtevantii, for example, they preserve the cup-shaped form and make a splendid bloom. The ideal cross between these two well-known kinds is seen in the hybrid which has been named Smithiana. In form the flower partly resembles each parent, being larger than that of N. Lotus, the seed parent, and a trifle smaller than that of N. Sturtevantii. The color is not intermediate between them, however, but is a delicate blush.

I have never been able to gather seed from N. Sturtevantii, although I have watched it every season since it was sent out. The pollen grains from its flowers are efficacious enough on other flowers. N. Smithiana, too, has not set any seed so far. The first season's flowers of this hybrid were rather disappointing, being quite small; this was partly due to a great profusion of growths from the little tuber which was set out along with the plant. All of this section, by the way, ought to be planted without tubers, as they are then more apt to concentrate their energy in one crown and produce very much larger flowers.

The large white-flowered Nymphæa dentata sets seed every time when properly fertilized with pollen from N. Devoniensis or N. rubra. Every intervening shade between the white and deep red may be obtained, such as is seen in the hybrids

named O'Marana, delicatissima and Deaniana. The hybrid with very dark flowers named Columbiana is a puzzle to me, as it is a cross between the kind with very dark-colored leaves which goes under the name of N. rubra and N. dentata, the first-named being the seed parent. One would suppose that a hybrid between these two well-known kinds would have flowers of a light red or pink color, but the flowers of Columbiana are darker than either of the forms of N. rubra or N. Devoniensis. Another peculiarity which the plant possesses is that the flowers are much smaller than those of either of the parents.

In order to make sure of success in hybridizing Nymphæas one or two little details should never be neglected. The first thing to do is to make ready for each flower a wire screen in the shape of a hood, the mesh to be small enough to keep out the smallest insects; this screen ought to be large enough to completely envelop the flower when it is fully expanded; it should be attached on one side to a stout stick, and merely placed over the flower by thrusting the end of the stick into the soil in which the plant is growing, taking care that the bottom of the screen is beneath the water, but before this is necessary the flower which is selected for seeding must be prepared carefully, and this is the most important part of the work. Begin just before the flowers expand in the evening, select a flower which is about to open for the first time, open the petals gently and remove every vestige of the stamens; this can be done perfectly with the thumb and forefinger. At this period of the flower's existence the pollen is unripe and there is not the least possibility of any of it getting on to the rayed stigma of the flower. After the operation is completed place the hood over the flower and let it remain till next morning. At the same time another hood should be placed over the flower selected as the pollen parent, taking care that it also is about to open for the first time; this will remove any possibility of insects visiting it and mixing pollen from other flowers with its own. Now, during the forenoon of the next day, just before the Lilies are about to close, examine the pollen-bearing flower, and if, as is likely to be the case, the pollen is ripe, shake it over the one from which the stamens were removed, and, as a further means of insuring success, nip off a few of the stamens and place them in the centre of the impregnated flower; next draw three or four of the inner petals together by their tips and join them by a pin, replace the hood, and if the flower sets any seeds at all it is reasonably certain that they cannot produce anything else than hybrid seedlings.

Botanic Garden, Washington, D. C. *G. W. Oliver.*

Orchid Notes.

CALANTHE VEITCHII is one of our most useful winter-flowering Orchids, and even small collections should not be without this showy plant. For the past month it has made a good show of flowers here, and they will last for several weeks yet. Our plants are grown in five-inch pots, with one pseudo-bulb in each pot. As the plants are without leaves when they blossom, we find it easier to arrange them when they are in small pots among other foliage plants, which make a good groundwork for them. There are three dozen plants in bloom now; they have flower-spikes a yard or more long. When the plants have finished flowering water is entirely withheld, and they are kept on a dry shelf which is near the glass roof, where they get an abundance of light, so as to harden and mature the pseudo-bulbs better. The repotting is done in March, when the young growth is about an inch long and just as the young roots start to grow. The plants are turned out of the pots and all the exhausted soil removed from the roots. The dead roots are cut back to within an inch of the pseudo-bulb, and this short piece of root which is left helps to keep the plants in place until they make new roots. Good drainage is very essential, and the pots are almost half-filled with broken crocks. Over the drainage is placed a layer of fern-root to prevent any clogging. When potting the plants the pots are filled up moderately firm to within an inch of the top. The plant is then placed on the top of the soil, and about half an inch more of compost is added, so as just to cover the base of the bulb. If the plants are not perfectly firm then they are tied to a small stake, which keeps them in position until the roots take hold of the new compost. A place where they get plenty of light suits them best after they are potted, and they are, therefore, placed on a shelf near the glass in the stove. After potting they need very little water for several weeks. If too much moisture is given at this stage the young growth turns black. When the plants have made good roots and fairly sized leaves they need an abundance of water. About July, the young bulbs begin to form, when weak liquid-manure can be given twice a week until the pseudo-bulbs begin to lose their leaves and the flowers begin to open. When the plants are in bloom they only need enough water to keep the flowers in good condition.

This beautiful hybrid was raised by Mr. Dominy at Veitch's Exeter nursery in 1856. It was obtained by crossing Calanthe rosea, then known as Limatodes rosea, with the pollen of Calanthe vestita. It flowered for the first time in 1859. The pseudo-bulbs are flask-shaped, six or seven inches long, and the leaves are large, plaited and light green in color. The long graceful spikes have rich, bright rose-colored, white-throated flowers two inches across.

Calanthe vestita is a handsome species that has been cultivated for nearly half a century. Although it is not quite as showy as the above hybrid, it is well worth growing and makes a good display at this season. It has roundish pseudo-bulbs with broadly lanceolate acuminate leaves, which are about a foot and a half long. The flowers are produced in long nodding hairy spikes. They are milky white, with a yellow blotch on the lip in front of the column, and they measure about two inches across. This Orchid was first discovered by Dr. Wallich, an Indian botanist, in 1826, but was not introduced to cultivation until 1848. Then it was collected in Moulmein by Dr. Kane and sent to England.

Calanthe vestita rubro oculata is a handsome free-flowering variety also in bloom. It has large delicate white flowers with a blotch of rich crimson in the centre.

Dendrobium Linawianum is a mass of handsome flowers. It has upright, deeply furrowed stems, which are a foot or more high and are swollen at the internodes. The young stems have oblong, obtuse leaves, which are about three inches long. The very beautiful flowers are produced in pairs from the joints on the two-year-old stems. The flowers measure more than two inches across, and the sepals and petals are oblong, acute, white at the base, and are of a rosy purple color in the upper half. The lip is ovate, reflexed, being of a bright crimson-purple and has a crimson spot on each side of the disk. This plant is grown in a basket, and when it requires rebasketing it is done in spring after it has flowered. It thrives in a mixture of fern-root, sphagnum and lumps of charcoal. During the summer months it is grown in the stove, hung up near the roof, where it gets plenty of light, heat and moisture. When it has finished its growth for the season, which is about September, it is removed to a cooler house, where it gets plenty of light and air, so as to ripen its pseudo-bulbs. It needs very little water during the early part of winter, when it is resting, just enough to keep it from shriveling. When it shows flowers it is taken into a warmer greenhouse, where it is watered carefully until all the flowers are developed. They last in good condition for about three weeks.

The sweet-scented Dendrobium aureum is also flowering now. Although it is not quite as showy as some other species of this genus, it is quite distinct and useful. Its flowers are produced in twos or threes from the nodes of the two-year-old stems. They measure about two inches across, the sepals and petals being a cream color. The lip is large and reflexed, velvety above, buff-yellow, streaked with dull red, and the column is orange-red. The flowers, before they perish, change their color to a deep golden yellow. During spring and summer the plant is grown in a hot, moist house, and in the fall it is removed to a cooler one. In winter it is kept dry and hung in a place where it can get all the sunlight it needs. It grows best in baskets in a mixture of fern-root and sphagnum. This Dendrobium is East Indian, and is said to have a wider distribution than any other species of this genus. It has been collected in eastern Assam, on the Khasia Hills, in Nepaul, the Madras Presidency, southern province of Ceylon, in Moulmein and in the Philippine Islands.

Dendrobium Ainsworthii is a beautiful hybrid between D. aureum and D. nobile. It was raised in the collection of the late Dr. Ainsworth, Manchester, England, and flowered for the first time in 1874. It makes a useful winter-flowering plant, and its fragrant flowers are very pleasing now. They are produced on the mature pseudo-bulbs and measure more than two inches across. The sepals and petals are white, with a slight tinge of rose. The lip is white, with a large central blotch of an amaranth color.

Another hybrid with the same parents as the above, but raised by Veitch, of Chelsea, is D. splendidissimum, which is also in bloom. The flowers of this hybrid are larger than those of the preceding, and more glossy. The sepals and petals are white and tipped with rosy mauve. The lip is white with a slight touch of yellow in it, and a rich deep purple blotch in the centre.

Botanic Garden, Harvard University. *R. Cameron.*

Forcing Hybrid Perpetual Roses.

ONE of the most important points in selecting hybrid Perpetual Roses for forcing is to procure such plants as are budded well down on the stock; plants budded high invariably become exhausted much sooner than those budded lower, when subjected to the trying ordeal of forcing year after year. The time to introduce the plants into heat must be regulated with reference to the time the flowers are wanted; about fourteen weeks is generally required from start to finish. It is necessary that the plants be first subjected to a thorough freezing to insure their breaking away freely. Pruning is also important, and in no case should the young shoots be left too long, about three good eyes being sufficient.

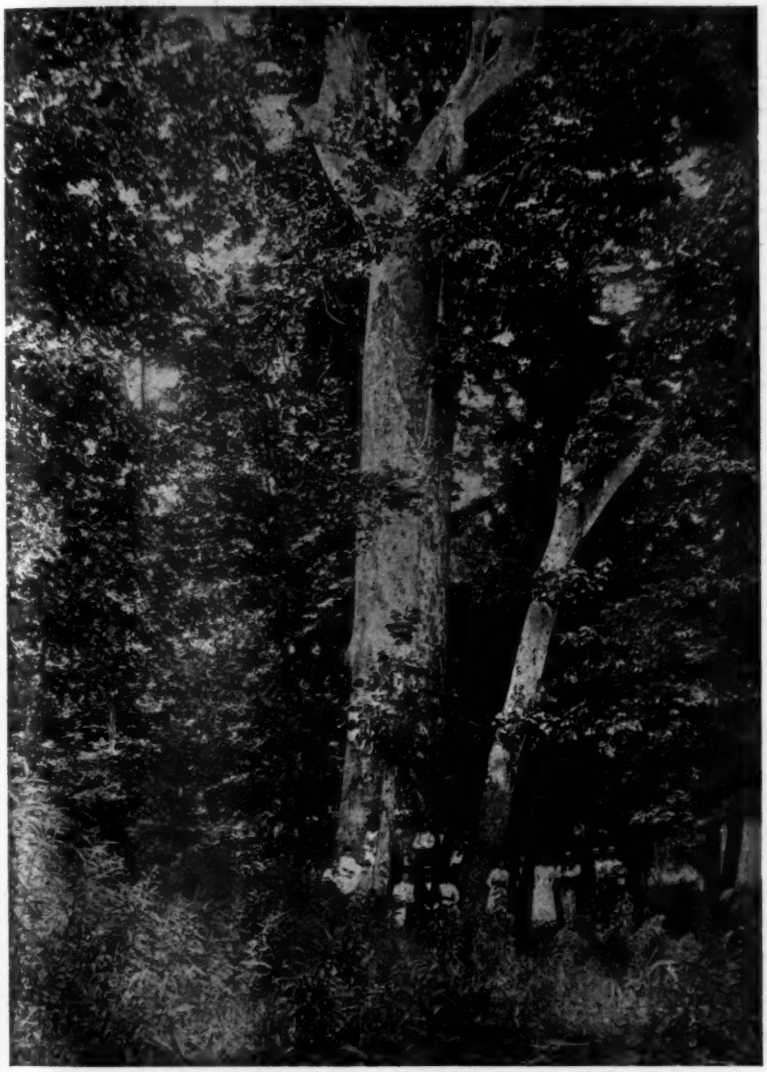

Fig. 6.—The Western Plane, Platanus occidentalis.—See page 51.

A night temperature of forty-five degrees will be quite sufficient for the plants at first, increasing to fifty degrees as growth advances and until the buds are well formed. After this time sixty degrees will do them no harm so long as the atmosphere of the house is not kept too dry. The first growth is probably the most critical in the whole process, as during that time there is greatest danger from stagnation. If water is applied too freely before the plants have had time to produce fresh roots the result will be a sickly stunted growth in place of the desired strong, vigorous break. We find light syringing twice daily and the maintenance of a moist atmosphere all that is required for the first three or four weeks. When the plants are growing freely, and especially after the flower-buds are set, frequent applications of liquid-manure will be found helpful, and the odor from the manure will assist in keeping down red spider and help to darken and strengthen the foliage. After blooming, repotting or top-dressing should be seen to, according to the requirements, and the same careful treatment continued, every encouragement being given to the plants until the growths have been matured. They may then be hardened off gradually, and toward the beginning of June they should be placed out-of-doors, the pots being plunged to the rims in ashes. The most suitable forcing varieties are Ulrich Brunner, Paul Neron, Magna Charta, Baroness Rothschild and Earl of Dufferin. The last two varieties are somewhat subject to mildew, and should be placed in the warmest end of the house.

Tarrytown, N. Y. *William Scott.*

Carnation Notes.

THE propagation of cuttings for plants for next winter can be begun now. We have already inserted cuttings of one or two slender growers like Lizzie McGowan, as it is well to start these early to have strong plants in the fall. Our main batch of Carnation cuttings will be inserted during February, although we find that such easily propagated kinds as Daybreak, William Scott and Tidal Wave make sufficiently large plants if not put in until March. If the sand in the propagating bench has been already used for other cuttings it should be removed and fresh material supplied, with which more satisfactory results will be obtained. At the bottom of our bench we put a layer of clinkers and coarse cinders; over this is placed a layer of sphagnum moss, and some three inches of sharp sand is ample for all propagating purposes. This should be pressed down firmly and watered with a rose can before the cuttings are inserted. From four to five weeks generally elapse before the young plants are ready to box off, and with careful attention at least ninety per cent. of the cuttings should take root. The percentage lessens somewhat later in the season. We find a bottom-heat of about sixty degrees about right. Care must be taken not to allow cuttings to wilt before being put in the bench, and to protect them from the sun's rays until rooted. Neglect of these simple precautions is the cause of many failures. Too much stress cannot be laid on taking cuttings from the strongest and healthiest plants, those produced on the flower-stems being the best. If plants are weak or diseased it is far better to buy stock from a reliable florist who makes a specialty of Carnations than to run the risk of perpetuating disease, with consequent disappointment.

We have recently boxed off our cuttings rooted for outdoor summer-blooming, and we keep them on a shelf close to the glass. In about six weeks these will be potted off singly into three-inch pots, or a size larger if the plants are extra-strong. In this latitude it is risky to plant out until the middle of May. By that time, with judicious topping and careful attention, the stock will be of good size. Only a limited number of sorts flower satisfactorily out-of-doors. Mrs. Fisher is still the best all-round variety, and with us is a mass of bloom and buds from July to November. Other kinds which have proved a success are William Scott, F. Mangold, Daybreak and one or two unnamed scarlet seedlings.

If plants on the benches have not yet been cleaned it is well to get this work done before the spring rush commences. That the plants yield better returns after being cleaned any one can testify who has tried it, yet many growers continue to leave the diseased, decaying and dead leaves on their plants the season through. Such foliage on Violets, Roses or Chrysanthemums is more noticeable than on Carnations, but the health

of the plants demands its removal from all these. Cleaning Carnations takes considerable time, but it can be done when other work is not pressing, and its benefits will be seen as the flowering season progresses. Where rust has obtained a foothold too much vigilance cannot be exercised. Every affected leaf should be picked off and the plants dusted with lime. Some growers think its spread is checked, but we are still awaiting a cure for it here. I think that keeping the plants picked clean, having proper atmospheric conditions, and paying attention to temperature and ventilation does as much to check the disease as any remedy I have seen tried. A number of prominent Carnation growers advertise their stock as being absolutely free from rust, and I believe there are men in the trade who do their utmost to send out perfectly clean plants, yet for the last year or two novelties have been sent out at high prices after being well boomed, which have turned out to be rusted beyond redemption. It is both an injury to the sender out and the buyer to place such stock on the market. Introducers of new varieties should state explicitly whether or not their introductions have taken disease or not, and no kind should be sent out, however good, if not clean. The American Carnation Society, at its forthcoming exhibition in New York, which promises to eclipse anything of the kind ever held, requires that plants must be shown as well as cut flowers of all novelties entered for certificates. This is a move in the right direction, and the inspection of the stock once or twice during the season by a committee of competent judges is better still. This will have the effect to lessen the number of novelties put on the market yearly and to improve their quality.

At this time of the year burst calyces and slender flower-stems, consequent on sunless weather, are very common, and clear, bright weather and freer ventilation are needed to check these defects. The benches now require rather more frequent waterings, and slightly stronger stimulants are given. With heavy firing red spider is apt to get a foothold on the plants which the heat from the hot-water pipes strikes most strongly. Syringing with a good pressure on bright mornings is the best preventive. We give our plants a night temperature as near fifty degrees as possible, with a drop to forty-five degrees on very cold nights. The top ventilators are opened a little each day when the temperature has risen over sixty degrees. Disbudding is now practiced by most florists and gardeners, and the larger blooms and stouter stems are proofs of its merits.

The interest of prominent Carnation growers is at present centred on the New York show and convention, and a number of promising novelties which will be staged there. It will be interesting to note how last year's seedlings—a number of which were certificated—appear this year. Among whites Storm King was one of the most admired last year at Boston. In this locality it does not appear to be much of a success and compares unfavorably with Alaska, which is good almost everywhere and proves itself to be the finest novelty of last season's introduction. It has a better stem than Lizzie McGowan and a better formed flower, and is likely to lead the latter popular variety by another season. Bride of Erlescourt has been thrown out nearly everywhere, being badly diseased. Bridesmaid, which some growers claim is a serious rival to William Scott, will never, I think, attain half the popularity of the last-named sort. It has not averaged more than one flower to the plant up to this time, and other growers near-by report the same thing. Rose Queen blooms more freely than Bridesmaid, but is of a less pleasing color; it has a good stem, but the calyx bursts badly and the plants take rust. Peachblow is too flimsy for a market flower. Della Fox, similar in color to the well-known Daybreak, will be largely grown about Boston another year. Those qualified to speak predict well for Myers & Santman's seedling. Maud Dean, one of Mr. John N. May's varieties, is also likely to be in considerable demand next spring. Daybreak has a sprawling habit of growth, and a novelty as free blooming, identical in color, and like William Scott in habit, would, no doubt, supersede it. Among dark pink shades Tidal Wave is still hard to beat when well grown. Lena Saling, a little paler in color, to be sent out this spring, and another of Mr. May's certificated kinds, is a promising sort. Meteor, sent out by Mr. C. W. Ward, although it has not proved nearly so floriferous as F. Mangold, is now yielding us a few very handsome flowers of a rich crimson-scarlet color. The plant is a clean and vigorous grower. There is a good opening for a new scarlet Carnation, as no kind now grown is altogether satisfactory. Hector is still the best we have here. With a stem like Mr. Hill's Jubilee, it would be an ideal scarlet. Portia, Emily Pierson and E. G. Hill all lack size. The Stuart is not useful in this locality; it has a grand stem, but the flower comes streaky, and it is only semi-double. Eldorado, yellow, raised by Mr. Shelmire, looks very well with Mr. Nicholson, of Framingham, Massachusetts. It has a large, well-formed flower, but rather weak stem. Among variegated sorts the contest seems to lie between Helen Keller and Minnie Cook. Those who are growing both seem to prefer Mr. Chitty's variety. Helen Keller is fine when grown as Mr. Edwin Lonsdale grows it. A few plants we have are doing well this year, but most of the florists say a large proportion of flowers fade before opening, and there are few perfect ones.

Taunton, Mass. *W. N. Craig.*

Correspondence.

California Oranges and the Frost.

To the Editor of Garden and Forest:

Sir,—The exaggerated and conflicting reports which have gone east in reference to the freeze of December 29–30 in southern California are partly explained by the fact that only recently has the full extent of the damage done become apparent. Growers, dealers and newspaper correspondents are naturally unwilling to make definite statements until sufficient time has elapsed for the full effects of the frost to show both upon the trees and the fruit.

It is now apparent that the Riverside crop is practically ruined. Riverside is the oldest orange-growing section in southern California, and the largest producer. Her crop this year was estimated at 3,400 carloads, out of a total of 10,000 for the state. The estimates of the loss have been placed at from 50 to 90 per cent. It is unquestionably much nearer the latter figure than the former, and the frost was so general that probably not fifty carloads of absolutely uninjured fruit could be picked from that now remaining on the trees. Much of it has fallen to the ground as a result of rain. Some of the young orchards are apparently dead, and the leaves are falling from the trees in many of the older ones. The proportion of trees actually killed will be very small, but in many orchards the trees have been so badly injured that the yield for a year or two will be greatly decreased.

Next to Riverside, Ontario and Pomona suffered most. In these districts the young trees are somewhat injured, and frost which would produce such a visible effect upon the trees must have frozen many of the oranges. But probably not more than fifteen per cent. of the oranges in these localities have been injured, and this would amount to only a few score carloads. None of the trees have been killed, and the damage will not materially affect their production another year.

Allowing for the fruit shipped east before the frost, which was something over 400 carloads, and the highest reasonable estimate of the frozen fruit, there are still left in southern California from 5,000 to 6,000 carloads of oranges which are uninjured, and which include a large proportion of the very finest fruit. It may be difficult for the eastern man to understand how orchards within a few miles of those frozen escaped entirely, and I will state some facts about topography and climatic conditions which may help to explain it.

The orange-growing sections of southern California lie principally in a series of valleys extending from Los Angeles seventy miles eastward to Redlands. These valleys vary in width from two miles to twenty. They are bounded on the north, south and east by mountain ranges. They are traversed on the north by the Santa Fé Railroad, and on the south by the Southern Pacific. It is up-grade all the way from Los Angeles to Redlands, the most easterly town, 1,300 feet above the sea. The only other orange-growing sections are Orange County, immediately south of Los Angeles, and portions of San Diego County, a hundred and fifty miles still farther south. The relative importance of these sections may be seen from the following estimate of their respective crops for this year: Los Angeles County, 3,750 carloads; Riverside, 3,400; San Bernardino, 1,700; Orange, 800; San Diego, 180.

Frost in southern California always depends upon purely local conditions; it is never the edge of a cold wave from the north, as was the case in Florida a year ago. The mountains and deserts to the north and east prevent this. It occurs usually during the longest nights of the year, and is a result of the rapid cooling of the earth after sundown and rapid radiation of the earth's heat through a rarified atmosphere. This cooling process begins soon after nightfall and continues until sunrise, the cold growing greater as the night advances, and being greatest just before sunrise. There is greater liability to frost in dry seasons than in wet, because radiation is more rapid through a dry atmosphere than through one which is charged with moisture. Low-lying lands suffer most, because the coldest currents of air settle closest to the ground, while

the warmer currents linger longest on the higher slopes, and also because the lower lands do not receive the rays of the morning sun as quickly as the higher altitudes. This item of the sunrise is an important one where the frost is a constantly increasing factor for destruction through the night, and where the amount of damage is largely dependent upon the length of time that the cold endures. Trees and fruit which would perhaps withstand cold for three hours would be ruined should the same degree of cold continue for six or eight hours.

These facts were fully illustrated in the recent freeze. This season has been very dry. Only a slender thread of snow rests on the highest mountains, where usually their slopes are covered halfway to their bases. The total rainfall up to the night of the frost had been less than two inches. The air was dry and heavily charged with electricity, and the frost occurred at a time when the days had been for weeks unseasonably warm. The frost was preceded by a high, dry wind, which swept the air of every particle of moisture. This wind died away before night. The cold set in soon after nightfall, and continued until sunrise. The lowest point reached by the thermometer, at Riverside, was 17 degrees; the lowest at Redlands, fourteen miles distant, but on higher ground, was 26 degrees. This difference of eight or nine degrees made the difference between the destruction of the crop at Riverside and its escape uninjured at Redlands. Most of the other sections of San Bernardino County which grow oranges are, like Redlands, on high ground, being the warm, sunny slopes of the foothills. They escaped, except in a very few of the lowest and most exposed localities, in which there was damage, so slight, however, as to be practically of no importance whatever. In Los Angeles and Orange Counties there was frost, but not enough to injure the oranges to any great extent. These sections are nearer the coast, and the air is not so dry as in the interior. The location of Pomona is in the middle of a wide plain, and is therefore more like that of Riverside than some of the other localities, and the district suffered accordingly. The United States weather observer at Los Angeles had the following to say about the frost at Pomona in his report for January 7th: "The temperature, December 30th last, at sunrise, ranged from 23 to 27 degrees, which was no doubt correct, as the flowers and vegetation showed the fact. There were but few oranges or lemons injured by the frost; many orchards suffered none at all, and the tender growth of lemon trees and lemon blossoms were untouched. Very young citrus trees were damaged in some places, but old trees none worthy of note." This report was, perhaps, as accurate as could be made at the time, but later observations have shown that the damage was greater than at first estimated. It will be noted that the temperature was lower than at Redlands, though higher than at Riverside.

Admitting that the crop of Riverside County is practically destroyed, we still have nearly all the crop of Los Angeles County, or, approximately, 3,000 car-loads. The crops of Orange and San Diego Counties, originally about 1,000 car-loads, have not been hurt by the frost; but the bulk of these are grown near the coast, and are not as fine as those grown in the interior. They are frequently infested with scale, and have to be washed. They are much more acid than the interior orange, and lack the rich, burnished color which the hot winds from the desert give the latter. They are also much slower in ripening, and for this reason most of the crop is still upon the trees in these localities. In San Diego County some oranges are grown in the sheltered valleys back from the coast, and are of excellent quality, but the coast-grown product is a sour fruit, of a light, almost lemon, color, and full of "rag." However, the whole product of this county, 180 carloads, is too small to be of much importance at present. In San Bernardino County there are about 1,000 carloads left, nearly all of which are the very choicest fruit that California produces. The original estimate of the best portion of this county was: Highlands, 200 carloads; Redlands and Crafton, 700, and Colton Terrace, 100. Of these about 350 cars have gone forward, most of it as early fruit, at a high price. There was no damage whatever in these districts by frost. This makes about 5,000 carloads of fruit left unharmed. Much of the fruit still upon the trees at Riverside will be sold, and the amount will be anywhere from 300 to 1,000 carloads.

The early shipments of oranges were, in the opinion of many, a blunder. The best of the fruit was immature, and could not possibly give the consumer a favorable notion of the California orange. The action of growers and shippers after the freeze was still more injudicious, if not actually dishonest. A demand was made upon all the outside districts for packers, and frozen oranges were rushed out of Riverside at the rate of fifty carloads a day. A few shipments were also made from Pomona. False and contradictory reports were sent out through the associated press and other agencies, which confused the eastern buyer. It is also alleged that frozen oranges were packed under the brands of localities where no damage had been done. The Southern California Fruit Exchange, which was organized ostensibly to protect the growers, did its share toward demoralizing the market by injudicious shipments. This hasty and ill-advised action is to be regretted, as it has caused a loss of reputation greater, perhaps, in the end, than the million dollars or more actually lost in the value of frozen fruit.

The fruit most badly frozen is now upon the ground, abandoned as worthless. One packer at Riverside threw away, last Thursday, twelve carloads, for which he had paid $7,000. The loss will come heavily upon some of the packers who had bought early, and took their chances of a frost. Badly frozen oranges rot and fall to the ground after a few days, especially if there is rain. Fruit that is frost-bitten, but not frozen, will remain upon the tree. The juices evaporate through the skin, and the pulp becomes dry and tasteless. Sometimes the flavor is injured, although there is no apparent change in the appearance of the orange. The remainder of the fruit forwarded from Riverside this year will doubtless be open to suspicions of these undesirable changes, but this will be only a small proportion of the total still remaining for shipment.

It is absurd to compare this partial disaster with the destruction of the Florida orange groves a year ago. Riverside has about 7,000 acres of bearing groves, and if all of them had been destroyed, instead of the possible five or ten per cent. that have been destroyed and the twenty or thirty per cent. that have been injured, the loss would have been balanced by the new groves coming into bearing in other localities.

There has been heavy loss at Riverside three years during the past six, and the frost of this year seems to indicate that the location has not justified the heavy plantings made there. Experience now shows that the higher lands are best adapted to citrus culture. It also shows that California is only upon the northern edge of the true citrus belt. The sheltered, sunny, foothill lands have never lost a crop through frost, but to come within six or eight degrees of loss every year is not a pleasant experience for the grower who anticipates a return of from $300 to $600 an acre from his orchard. If the market recovers, as it should, from the demoralizing effects of the frost, the best groves will pay very handsomely this year, and will be as good a hard-times investment as any one could wish.

Redlands, Calif. *Wm. M. Tisdale.*

Notes from Southern California.

To the Editor of GARDEN AND FOREST:

Sir,—Mr. Watson's remarks upon the Cherimoyer (page 14) lead me to say that this fruit is successfully grown here in some localities. Along the foothills on the northern side of the beautiful Cahuenga valley, near Los Angeles, quite a number of trees have been planted. From the garden of Mr. Jacob Miller I have had specimens quite four inches in diameter. A more delicious fruit I have never tasted. In flavor I would compare it to a combination of the pineapple and the strawberry. The flesh of those produced here is creamy white. It ripens here during March, April and May, and good specimens retail at twenty cents each. In this same garden (Mr. Miller's) are growing a number of uncommon trees and plants. A Coffee-bush, some eight feet high, produces annually a profusion of fragrant flowers and ripe berries. A good-sized Carob-tree bears pods regularly. There is also a grand specimen of Plumieria alba (Frangipani), four or five feet high and as much in diameter, which blooms abundantly during late summer and autumn, filling the garden with fragrance.

The belated rains have at last arrived, and the landscape is fast assuming the greenness of spring-time. The farmers are now shipping from this favored locality green peas, string beans, tomatoes and ripe strawberries, and in the water garden Aponogeton distachyon is flowering freely.

Los Angeles, Calif. *Edmund D. Sturtevant.*

Irrigation in Horticulture.

To the Editor of GARDEN AND FOREST:

Sir,—In your report of the meeting of our Horticultural Association at West Chester, Pennsylvania, on irrigation, I am reported as saying that we paid eighteen cents for a hundred gallons of water; the figures should have been fifteen cents for a thousand gallons. When I said that a one-inch pipe with eighty pounds pressure will irrigate a quarter of an acre, I

meant that such a pipe running a day would answer for one application. As the subject of irrigation has become of unusual interest, permit me to add some of our experience. We have used water to a considerable extent for two seasons past, and are satisfied that it pays on some crops even when bought by the gallon. The past summer we used not less than 125,000 gallons on Potatoes, Cabbage, Cauliflower, Celery, Horseradish, Sweet Corn and Strawberries.

The first consideration is not only will it help the crops, but will it justify the expense, and when we pay for water by the gallon the expense rises as rapidly as the water flows from the pipe. Where the water can be pumped or collected by damming a stream, the increased use does not increase the cost, and if the first cost is not too high irrigation would be profitable in very many cases. There are few summers without one dry spell at least, and when this is not too long it will pay to irrigate many crops even at the price we are paying, but in a continuous drought, such as that of the past season, the expense will be too great, except, perhaps, on a few fancy crops, such as Strawberries, Celery and Cauliflower.

Subirrigation is the best method for field crops, but for market gardening a full supply of water is needed on most crops. Crops that require only a short season cannot wait long for rain and then reach perfection.

Marietta, Pa. *H. M. Engle.*

Meetings of Societies.

Nebraska State Horticultural Society.—II.

HORTICULTURE IN EASTERN NEBRASKA.

A CAREFUL discussion of the comparative advantages of fruit-growing here and in other sections was presented by E. T. Hartley. Mr. Hartley has given special attention to the advantages of the Colorado fruit-growing sections during the past season, and has come to the conclusion that the prospects of eastern Nebraska are as good as those of Colorado. There is a great deal of booming in the matter of fruit-growing as well as in other lines. We are inclined to make too much of our successes and too little of our failures, to report the returns from exceptional trees, unusual prices, etc. Reaction is the inevitable result of such a course. He has no desire to ignore the disadvantages of Nebraska, but believes that when both advantages and disadvantages are carefully compared we shall find a balance in our favor. Nebraska has seen forty years of prosperity, and it is unlikely that its whole character will now change. It is only a matter of common observation that other states have seen similar periods of depression from time to time. Moreover, orchardists have suffered less than other classes during this time. While Corn has in countless instances failed to produce any crop whatever, orchards which have been well cared for have given fair, and in some cases heavy, returns. It is also a significant fact that while corn is now selling at fifteen or sixteen cents a bushel, apples are bringing from $2.50 to $3.00 per barrel at wholesale. When we consider carefully the cost of drainage, the disadvantage of working among stumps and stones, the cost of irrigation, the backward civilization and other disadvantages which must be encountered in the different sections of the country, we see that our own location is not so unfavorable after all. There are many drawbacks to irrigation—first, the cost of the water-right and fees, then the increased cost of cultivation, together with numerous annoyances that an outsider never dreams of. Mr. Wilcox stated that it requires two men to irrigate and care for ten acres of orchard, while in Mr. Hartley's orchard two men and one team will care for one hundred acres. He can cultivate the whole of his orchard while the men who use irrigation are plowing out the furrows to apply the water. Then these furrows must be gone over with a hoe to correct irregularities, remove clods, etc., and this may take more time than to make the furrows in the first place. The short rows which irrigation demands increase the cost of cultivation materially. Even if a crop can be secured every year by means of irrigation, it is not likely to prove as profitable as the same amount of labor applied to more land, but with a crop only every other year. Transportation is just as important as production. In this matter the Colorado growers work under a very serious disadvantage. In fact, Mr. Hartley presented figures, gathered on the ground, which seem to show that after the crop is all grown and ripe upon the tree at Grand Junction it then costs over two dollars a barrel to gather, pack, ship and market it in Denver or Pueblo. Mr. Hartley found that at Grand Junction he must pay twenty cents a dozen for peaches grown there, while in Denver the same peaches were selling at two dozen for fifteen cents. This year has demonstrated the ability to produce fruit in eastern Nebraska in spite of drought. Moreover, with the small fruits, which yield a large return from a small amount of ground, it is possible to profitably lift water by means of windmills to help out the rainfall. This cannot prove profitable for ordinary farm crops, for there is too little margin in the possible product of an acre. The loss of water by seepage and evaporation is too great also, even if reservoirs are employed, to make the undertaking feasible, except for those crops in which the market value is high. Hard winds, cold waves and frosts have been much more injurious than drought even during these recent dry years. Many orchards have proved an unexpected blessing to their owners during these trying years.

E. M. Pollard, of Nehawka, gave results of work and statistics to show that orcharding in Nebraska had proved a profitable venture with them thus far. They make a specialty of apples and cider. The cider is heated to about 150 degrees, Fahrenheit, by steam and run into heated barrels while still hot. By this means the cider is kept sweet, provided only that the package is completely air-tight. They also employ vinegar generators, by which they can secure first-class vinegar from fermented cider in thirty-six hours. They find it very difficult to compete against the cheaper corn vinegar, which is nearly everywhere sold as cider vinegar. From the best statistics which he could get he finds that the average price to the grower of apples in Nebraska during the last seven years has ranged from $1.50 to $3 00 per barrel. They now set eighty trees to the acre, but with only forty trees to the acre, at an average price of fifty cents per bushel, the returns would be twice as great as can be realized from corn, even if the yield should be but one bushel a tree, while it ought to be five bushels. He deprecates the continued planting of the Ben Davis Apple. In the better family trade, which they aim to supply, he finds it difficult to dispose of this variety, and in their newer plantings it is discarded altogether. Many of the Apples of good quality which succeed in the east fail here, but the Swaar does well.

ARE THE BIRDS FRIENDS OF THE HORTICULTURIST?

This was the question discussed by Professor Bruner, of the State University, and he made a strong plea for these feathered inhabitants of our fields and gardens. Seventy-five per cent. of the food of birds consists of insects. Moreover, when we consider their ability to withstand cold and their powers of endurance, it is apparent that they must require much fuel to maintain the bodily functions, and consequently must be hard eaters. There are fifty more species of birds found in Nebraska than are reported from any other state except Texas. There are undoubtedly more than 75,000,000 birds in Nebraska for half the year. These, upon the most conservative estimate, destroy thousands of bushels of insects. The winter birds subsist largely upon weed seeds, thus causing marked depreciation in the spread of these nuisances. Numerous figures were quoted showing the contents found in the stomachs of different birds when examined for that purpose. The quail is one of the best friends of the farmer and horticulturist, for it destroys millions of chinch bugs. The flicker also eats chinch bugs. Professor Bruner believes that the unusual destruction of fruits caused by birds within the past few years has been primarily owing to their lack of water. Upon this point, however, many of the growers did not agree with him.

The Western New York Horticultural Society.—II.

THE INVISIBLE FRIENDS AND FOES OF THE FARMER.

ON this subject Professor Roberts said:

The soil teems with invisible plants or low vegetable organisms which prepare it for higher growths by making available the combined nitrogen in the soil. These invisible plants need a certain amount of air, moisture and warmth for development and growth. They are ever at work breaking down the crude material and transforming it into plant-food, and the fruit grower, like other cultivators, must learn that, like higher vegetables, these flourish best when their home is warm, mellow, dark and moist. Since there are from three to six thousand pounds of potential nitrogen in the first foot of an acre of fairly fertile soil the advantage of multiplying these nitrifying organisms is apparent. The cultivation of the soil unlocks this vast storehouse of food and puts it into circulation. Proper cultivation not only promotes the process of nitrification, but it makes available phosphoric acid and potash, so that these considerations point to a short rotation, frequent plowing, partial soiling and the use of leguminous plants whose roots gather free nitrogen from the air. The objects of cultivation are primarily and chiefly not to make the soil porous

so that the roots of plants can enter it easily, but to promote the invisible vegetable growth and chemical action of the soil which, while holding on to the water as minutely divided, will allow flowing water to pass downward into the subsoil. Water is nature's universal carrier, and it transports all nutrients into and out of the circulation of vegetables in growth. It not only lifts up tons of solid matter through the stems and trunks of trees and smaller plants, but it breaks rock and levels hills and transports them to the sea. Nearly all the moisture used by plants is brought to them by the silent forces of capillarity, and if the soil is in proper physical condition moisture flows upward to the roots of vegetation from the reservoirs in the subsoil as certainly as it runs downward by gravitation.

This is the underlying principle of successful husbandry—an ample reservoir for stored moisture to tide plants over critical periods held by capillarity in well-prepared soils which contain no free water. Under-drainage and deep tillage furnishes this reservoir, and two or three inches of surface soil tilled until it is loose, light and porous prevents the water from evaporating and passing off into the air, so that it is retained in the soil where it must be drawn up through the roots of the plants.

MISTAKES IN ARRANGING HOME GROUNDS.

In speaking of this subject, Mr. W. W. Parce, of Rochester, mentioned the disposition to plant something or to build something everywhere—fences and hedges where none were needed, flower-beds and fountains or a statue to occupy the centre of a lawn which should be open turf. Another error is the mania for making grounds look artificial, formal terracing where nature's way would answer better, rows of trees and shrubs instead of natural groups, trees and shrubs trimmed into unnatural shapes. In many grounds, such trees as Kilmarnock Willows, White Birches, variegated Altheas, Purple-leaved Plums, Irish Junipers and Smoke-trees and a few other trees of singular form, made up the collection, with a Geranium bed, and one of Coleus, and a dozen Rose bushes, each of a different shape. If a man were to dress himself in articles of such staring contrast he would be arrested. In this locality most of the trees and shrubs are deciduous, and there are none with variegated foliage except for a week or two in the autumn. This suggests the use of similar plants in natural grouping, and although it is not desirable to turn a dooryard into a primitive wildwood state, it is true that those places which are treated in what is known as a natural manner are most attractive. Highly colored plants and flowers should be kept out of the foreground, where peaceful scenery and restful forms are needed. To produce these quiet, homelike effects, groups and single specimens of trees and shrubs which are not of such pronounced types as to catch the eye by their peculiarities, should be used, for of these last we will grow weary on long acquaintance.

EVAPORATED FRUITS IN WAYNE COUNTY.

Mr. B. J. Case regretted that large quantities of cheap and worthless apples, half-ripe, badly pared, not thoroughly cured, and treated with too much brimstone were sent out as evaporated apples. This year dealers have returned load after load when they have not been up to standard. Fruit like this can be delivered at the station for from five to seven cents a pound, but it is not fit to eat. In 1893 heavy storms blew down thousands of apples that were hardly fit to feed to hogs, and these were all evaporated. Fifty car-loads of this stuff were marketed in Wayne County. It is no wonder, therefore, that good apples were cheap in 1894 and that they did not bring good prices in 1895. When consumers have received this unpalatable and unwholesome product once they refuse apples the next time. We can learn much from fruit growers in California in this matter, where everything is done neatly and only ripe fruit is used. To hold our market we must keep a uniform product, pare more cleanly and dry more thoroughly, so that the product will keep. They are learning, however, in Wayne County, and first-rate evaporated apples are now sure to bring good prices, and so are first-rate raspberries, of which a million pounds are produced in this county. Berries are stored by packing in a dry barrel and kept in a cold place. Apples, to hold their color, must be packed in boxes and put in cold storage by the first of May. A load of apples well dried in 1891 and put in storage in February, 1892, is now as good as it ever was. Good work is done by evaporating apparatus of all grades and sizes, but the upright-flue system seems the most thorough, and the hot kiln the cheapest. There are no apples evaporated in this state which will grade "fancy" in Boston. Some will in New York and Chicago. One-sixth of the Wayne County product will grade "fancy" in Boston, and five-eighths "prime." Of the prime there are two grades—one dried on wood and the other on wire. On account of the German law prohibiting the importation of wire-dried fruit, wood-dried apples bring a higher price when Germany is buying freely.

THE EXPERIMENT STATIONS AND FRUIT-GROWING.

On this subject Mr. W. D. Barns said, in part, that the prime work of the stations should be scientific—that is, they should investigate principles, but they should also make practical tests in matters which involve too much expense for the individual fruit grower. For example, they should try different methods of irrigation and ascertain what kinds of fruits are most benefited by it. Of course, we must look to the stations to find whether the San José scale and other insects are liable to be a continuous and growing pest here, and, if so, how they are to be suppressed. The stations, too, might well try to find some substance which will stick to a glossy surface so that it can be used as a vehicle for fungicides and insecticides. But, however good the stations' work, the growers will get no benefit from it unless they read the station literature. It should, therefore, be the duty of every one to interest his neighbors to send their names to be put on the mailing list. At every institute names should be gathered not only of farmers, but of the special lines in which they are interested, so that each one will receive just the literature that he needs.

American Forestry Association.

THE characteristic feature of the annual session of the American Forestry Association at Washington, last week, was the hearty coöperation of several leading public men, especially of the chairmen of the Public Lands Committees of the Senate and of House of Representatives, the ex-chairman of the House Public Lands Committee, and now leader of the minority, and the Secretary of Agriculture. Secretary Morton presided at a largely attended evening meeting, which was addressed by Senator Dubois and Representatives Lacey and McRae. The Secretary has long been known as an enthusiastic advocate of rational forest management, and his opening remarks pointed out from a statistical point of view the folly of depleting our forest resource and the evil consequences to agriculture. It was to be expected, however, that the founder of Arbor Day, which is Mr. Morton's distinction, would enter heartily into a movement for the preservation of the national forest domain, but more notable and significant were the emphatic utterances of Senator Dubois, in whose state of Idaho much of the best of public timber-lands remain, which are looked upon by the people as their rightful property, to be used at will. Mr. Dubois displayed a familiarity with the forest conditions of his state hardly to be expected from one who had not made the subject a special study. He explained the causes of the failure of the timber agents to protect the forests on the public domain, and expressed his earnest hope for the early passage of some such comprehensive legislation as is proposed in the bill introduced by Senator Teller (S. 914).

Congressman Lacey discussed in a delightful way the destruction and repair of our natural resources, and the audience was fascinated by his wit and his poetic pictures of the rich woods and running brooks, once so abundant, and now rapidly disappearing. As a means of repairing our natural forest resources he considered Government action indispensable. He argued that the Government alone can hold tracts either long enough or large enough to effect the great climatic purposes involved in the preservation of the forest cover. The laws providing for timber reservations were a great step in this direction, but it was also necessary to provide for their use. A thorough system of cutting this timber rationally ought to be provided under which the wants of the people might be satisfied. But this should be done with such system as to preserve them as a whole.

Congressman McRae, who was chairman of the Public Lands Committee in the last House, and is a member of the committee at present, spoke of the proposed legislation for an administration of the forest reservations. H. R. 119, which, being reintroduced by him with the same number, goes by the name of the McRae bill, although not ideally the best, contains such features of administration as it would be possible to get passed at present, when improvements might be made afterward from time to time. This bill was actually passed both in the Senate and the House of the last Congress, but failed by unavoidable accident to go to conference committee and to become a law. He expressed the belief that at the present session its passage might be effected.

The Forestry Association is to be congratulated on having secured from three legislators of such prominence emphatic

expressions of sympathy with their purposes, and the country at large will join in the hope that their expectations of successful legislation may be realized during the present session.

From the report of the Executive Committee it was learned that the membership of the association had rapidly grown to over 600, and it now feels strong enough to support a regular monthly or bimonthly publication, and steps to establish such a publication are presently to be taken by the Executive Committee as well as to secure an affiliation with the various state organizations.

Notes.

According to official statistics the importations of lemons into the United States during the past ten years amount to $38,500,680.

In the February bulletin of the well-known Thayer Fruit Farms, it is stated that after the land is put into high cultivation the actual cost of bringing an acre of Blackberries or Raspberries, well set and with no missing hills, to a good bearing age, is from $125 to $150.

Fruits are usually considered luxuries, but Mr. G. C. Snow, of Penn Yan, New York, presented many analyses to the horticultural meeting at Rochester to show that at present prices more heat-producing and life-sustaining power could be bought for the same money in the shape of fruits than of most other articles of diet.

Professor Massey sends us a photograph of some flowering plants of the Chinese Narcissus from bulbs grown in water. The specimens are very well grown and seem to dispose of the objection that bulbs grown in North Carolina will not flower in water. Professor Massey writes that he has Dutch Hyacinths in bloom under glass, Trumpet Narcissi and Fresias, from home-grown bulbs, which are quite as good as any imported ones.

In a recent lecture, Professor Goodale stated that one who wishes to see the showy plants of the tropics at their best ought not to go to the jungle or forest where they are widely scattered and in many instances crowded out of proportion and not in the best health. Under the care of an intelligent gardener all their caprices are humored and they thrive better than they do where they have to shift for themselves. In a stove like that of Mr. Hunnewell, at Welles'ey, Massachusetts, and in similar places, where the treasures of the torrid zone are gathered together from the entire circuit of the globe, these plants have a brilliancy of bloom and a perfection of form which are rarely seen in their natural abode.

Oranges have been in light demand for several weeks past, due to the unsound condition of the last of the Jamaica crop and to the injury by frost to the California fruit. Valencia oranges have been selling at a loss recently, but a cargo which arrived in sound condition early last week realized satisfactory prices, and sold for $4.00 to $4.62 a box in wholesale lots. On Saturday, however, practically as good oranges from Spain brought only $1.50 a box. Lemons, too, are selling at low prices, Messina, Palermo and Malaga furnishing the main supplies. Bananas share in this depressed condition, and the highest grade of fruit from Port Limon commands but $1.15 a bunch at wholesale, while smaller bunches sell for forty cents each.

Mr. Smith Hawley, of Luddington, Michigan, in a lecture before the Horticultural Society of that state, said that the picture so often seen in agricultural papers of a man standing on a wagon and throwing spray into Apple-trees as he was drawn along is a delusion. To do thorough work one must go all about a tree and throw spray upon it from every direction. When this work is properly done the trees will retain their foliage until the snow falls; it will be bright, healthy and in good working order long after unsprayed trees are bare. As a result, trees will produce much fruit on off-years, and the fruit, because properly ripened, will keep better than that grown on trees weakened by the attacks of fungi and insects.

A class of advanced students who are fitting themselves to be professional horticulturists meet once a week at the residence of Professor Bailey, in Ithaca, New York, for the purpose of an informal discussion of current horticultural topics or matters of history and criticism. There are about a dozen of these students, who are most of them Bachelors of Arts or Bachelors of Science, graduated from different agricultural colleges or universities, and they together constitute a class of mature and trained men such as probably have never before been brought together in this country for the express study of higher horticulture. The topic last week was The Lindleys—their times and work. Other topics have been The Downings; Jethro Tull and the Tillage of Land; The Commanding Factors in New York Pomology.

The recent subscription of $10,000 to the endowment of the New York Botanical Garden by Mrs. Esther Hermann increases the fund to $260,000, besides $5,000 worth of plants contributed by Mr. James A. Pitcher. Some 250 species of trees and shrubs, besides those already in Bronx Park, where the Garden is to be located, have now been placed in a temporary nursery, and the construction of roads and erection of buildings may be begun during the present season. The Finance Committee of the Board of Managers will be glad to receive subscriptions from any one who wishes to follow Mrs. Hermann's generous example. All persons intending to contribute can communicate with Mr. James A. Scrymser, chairman of the Finance Committee, 107 East Twenty-first Street, or with Mr. J. Pierpont Morgan, Treasurer, 23 Wall Street, New York. Inquiries as to the scope and progress of the enterprise will be answered by the Secretary, Professor N. L. Britton, 41 East Forty-ninth Street, this city.

The St. Louis *Lumberman* says that there is no wood which equals the Cypress in value, of which so large a proportion of the total supply still standing is put into market every year. The president of the association predicts that in ten years there will be but seven mills cutting Cypress in Louisiana, in twenty years but four, and in twenty-five years none. This means that within ten years from sixty to seventy-five per cent. of the Cypress will be cut and sold, and that probably half of all the Cypress now standing will have been marketed before the end of the century, and yet the production is now only about two billion feet, say, one-thirtieth that of White Pine, the wood with which it mainly competes. Cypress belongs to the finer class of woods, and it certainly seems short-sighted to sell it for less money than it must soon be worth. It is not abundant, nor is it rapidly reproduced, and it is practically certain that when the present supply is used up that will be the last of cypress lumber as a commercial product.

Mr. Rydberg prints in the third volume of the *Contributions from the United States National Herbarium* an interesting paper on the flora of the sand-hills of Nebraska, a region extending from the ninety-eighth to the one hundred and third degree of west longitude and from the Niobrara River on the north to the North Platte River on the south-west. This is a region of shifting surface and of sandy soil, which is carried away by the wind when it is not held down by the roots of plants or otherwise protected. Some attempts at agriculture have been made in this region, but a farmer, after breaking his field, may find it transformed into a deep hollow and its soil deposited miles away, perhaps, in a great drift which serves as the foundation for one of the hills which are the characteristic feature of the region. Probably once covered by a forest of Pines, the only trees of the region now are Willows and Poplars, confined to the river-bottoms, the largest part of its flora being composed of grasses, sedges and low leguminous plants. A Thistle, the Cnicus Hookerianus variety, of Gray, is elevated by Mr. Rydberg to specific rank as Carduus Plattensis, a plate accompanying his description.

In a bulletin issued by the Chemical Division of the Experiment Station of Minnesota on the composition, digestibility and food value of potatoes, a cross-section of a tuber is given, in which the relative amount of water and other compounds is graphically illustrated. Three-fourths of the potato is water. One-fifth of it is starch, with limited quantities of fat, fibre, ash, malic acid and pectose or jellies. Only two and a half per cent. of protein occurs, and only about half of this is digestible. It is noted that early varieties of potatoes contain less starch and a larger proportion of protein, because the protein or nitrogenous compounds are formed in the early part of the growth of the tuber, while the starch is added at a later stage. For starch-making the medium-sized and later varieties are preferable, but in excessively large potatoes the jellies and other substances replace the starch. A large part of the limited quantity of albumen in potatoes is often lost in cooking; since when they are placed in cold water to boil much of this material will be extracted while the water is warming up, and, therefore, most of the vegetable albumen is lost. If the tubers are placed directly in boiling water the albumen is coagulated and retained. Peeled potatoes, when placed in cold water and boiled, lose four-fifths of their albumen. Potatoes not peeled, and started in hot water, lose only one-fiftieth. This means that when a bushel of potatoes are improperly boiled as much protein is lost as is contained in two pounds of beefsteak.